

May 14, 1996

VPCD-96-05 (LDV/LDT/SM/ICI)

Dear Manufacturer:

SUBJECT: Use of Indoor Facility to Determine Running Loss FTTs

This letter provides guidance regarding the use of an indoor facility, e.g. a heated wind tunnel laboratory facility, to determine the on-road fuel tank temperature profile (FTTP) required for the running loss test. Our policy on this matter is outlined by the provisions of 40 CFR 86.129-94(d)(1)(ii) and (iii), as revised in 60 FR 43880, August 23, 1995, and as follows:

1) Background material is provided in the provisions of §86.129-94(d)(1)(ii). These provisions allow manufacturers to use one FTTP to represent several different models within the manufacturer's product line, provided the FTTP test vehicle has "the greatest expected fuel temperature increase during driving of all those models it represents." EPA encourages manufacturers to reduce the number of FTTP test vehicles where appropriate (for both indoor and outdoor testing). Manufacturers should use good engineering judgement to determine the appropriate number of FTTP test vehicles required to represent their product line. Typically, we would expect manufacturers to generate different FTTs for each combination of engine displacement, carline, and fuel tank within their product line (where differences in fuel tank material, insulation, size, geometry, location, and the in-tank fuel return geometry would normally require a different FTTP). EPA expects manufacturers to use good engineering judgement to select "worst case" test vehicles in terms of such parameters as underbody air flow, exhaust system proximity to fuel lines, volume of fuel which returns to the tank, type of fuel cooler, vehicle suspension, and any other parameter expected to influence fuel tank temperatures and/or fuel tank pressures. [Vehicle suspension is included because it may influence fuel tank pressures, especially when a vehicle is traveling over rough road surfaces.]

2) For initial approval of an indoor laboratory method of

determining running loss FTTPs, manufacturers should supply correlation data on a range of vehicles representing the breadth of the manufacturer's product offering for which FTTPs will be generated in their indoor laboratory facility. The vehicles should be equipped with appropriate exhaust and evaporative emission control systems. Fuel temperature, vapor temperature, and fuel tank pressure should be measured on the road on several different days while determining FTTPs according to the procedure contained in 40 CFR 86.129-94(d); and also several times in the laboratory facility while determining FTTPs according to the manufacturer's procedure. EPA prefers that the indoor FTTP be determined prior to determining the outdoor FTTP, whenever possible. EPA approval will be granted for the range of vehicles for which correlation data were supplied. Approval criteria is contained in §86.129-94(d)(1)(iii) as follows:

"Specifically, fuel temperatures and pressures from indoor driving should be at least as high as measured when driving outdoors according to the procedures described in this section."

3) The provisions of §86.129-94(d)(1)(iii) specify that the "design of the laboratory facility should include consideration of any parameters that may affect fuel temperatures, such as solar loading, pavement heat, and relative wind velocities around and underneath the test vehicle." To satisfy this requirement, manufacturers should supply an engineering analysis of how their indoor facility is designed to simulate the following outdoor conditions and vehicle parameters:

- ambient temperature
- solar loading
- pavement heat
- air flow around and under the vehicle
- air flow in the vicinity of the fuel tank
- turbulence around the fuel lines and vapor lines
- effects of tire heat, especially for 2WD indoor dynamometers
- vehicle fuel tank skin temperature
- fuel sloshing effects, when cornering and driving over bumps
- other parameters which affect fuel temperature, vapor temperature, and fuel tank pressure.

Manufacturers should supply indoor versus outdoor comparison data wherever possible. EPA does not intend to approve the use of indoor facilities which simulate only the "best case" combination of outdoor conditions and vehicle parameters.

4) The provisions of §86.129-94(d)(1)(iii) require that the

"Indoor testing to develop the fuel temperature profiles must be conducted with little or no vehicle-specific adjustment of laboratory parameters." To satisfy this requirement, manufacturers should supply a statement and justification that their facility meets this criteria. Manufacturers should also supply EPA with a copy of the standard operating procedures used to generate FTTs, including laboratory set-up procedures, laboratory operating procedures, vehicle preconditioning procedures, and vehicle operating procedures. The operating procedures should describe how ambient temperature, solar heating, in-floor heating, air flow, vehicle load, and any other parameters are controlled during the FFTP generation.

5) The provisions of §86.129-94(d)(1)(iii) require that "Manufacturers would need to maintain an ongoing demonstration of correlation between laboratory and outdoor measurement of fuel temperatures." Initially, EPA would expect manufacturers to satisfy this requirement by supplying data on at least three vehicles per year or 5% of the manufacturer's FTTs generated per year, whichever is greater.

Initially, EPA intends to approve these requests for one year only. Therefore, in subsequent years, to continue using an indoor facility, manufacturers would need to supply a description of any changes (e.g. procedural changes or equipment changes) which have occurred since the previous approval, plus the additional correlation data discussed above. Eventually, EPA hopes to allow manufacturers to self-approve the use of indoor FFTP facilities and supply a statement in their application for certification that their facility meets the requirements contained in 40 CFR 86.129-94(d), and also meets the requirements contained in this letter.

If you have questions regarding this matter, please contact Dave Good at (313) 668-4450.

Sincerely,

Jane Armstrong, Director  
Vehicle Programs and Compliance Division  
Office of Mobile Sources

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